

1. An apparatus for operably connecting an electrical source to a conductive coating, the apparatus comprising:

a substrate comprising a structural material;

a conductive coating applied to the substrate;

5 a conductor comprising strands configured to be separable and electrically conductive for providing electricity to the conductive coating;

a clamping mechanism configured to apply a clamping load urging the conductor toward the conductive coating; and

10 the conductor, wherein the strands are further configured to distribute mechanical stress and strain induced by thermal expansion and the clamping load sufficiently to substantially reduce damage to the mechanical and electrical integrity of the conductive coating.

2. The apparatus of claim 1 wherein the strands are configured to extend along tortuous paths providing redistribution of electrical and mechanical loading directed toward the conductive coating.

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3. The apparatus of claim 2, wherein the strands are configured to provide spring motion and corresponding forces for distributing mechanical loads between the clamping mechanism and the conductive coating.

20 4. The apparatus of claim 2, wherein the strands are configured to provide distribution of mechanical motion of the conductor in order to minimize shearing forces directed to the conductive coating.

5. The apparatus of claim 1, further comprising an interface layer positioned between the conductor and the conductive coating.

6. The apparatus of claim 5, wherein the strands are unbonded to one another and to the
5 interface layer.

7. The apparatus of claim 6, wherein the conductive coating, the interface layer, and the conductor provide dissimilar metals at each contact point therebetween.

10 8. The apparatus of claim 1, wherein the strands are braided.

9. An apparatus for operably connecting an electrical source to a conductive coating, the apparatus comprising:

a substrate comprising a structural material;

a conductive coating applied to the substrate;

5 an interface layer applied over the conductive coating and configured to conduct electricity thereto while transferring insufficient force to separate the conductive coating from the substrate; and

a conductor for providing electricity to the interface layer, the conductor being positioned in contact with the interface layer and comprising strands configured to be separable and electrically
10 conductive.

10. The apparatus of claim 9, wherein the interface layer is further configured to selectively distort elastically and plastically in response to localized loading of the strands thereagainst.

15 11. The apparatus of claim 10, further comprising a clamp configured to impose a load urging the strands against the interface layer.

12. The apparatus of claim 10, further comprising a clamp configured to impose a load configured to selectively distort the interface layer to receive the strands therein.

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13. The apparatus of claim 12, wherein the interface layer is configured to elastically distort to an extent selected to maintain an effective contact pressure between the interface layer and the strands.

14. The apparatus of claim 13, wherein the interface layer is configured to plastically distort to an extent selected to provide an effective contact area between the interface layer and the strands.

15. An apparatus for operably connecting an electrical source to a conductive coating, the
5 apparatus comprising:
a substrate comprising a structural material;
a conductive coating applied to the substrate;
an interface layer applied over the conductive coating and configured to transfer to the
conductive coating insufficient thermally-induced force to damage the integrity of the conductive
10 coating with respect to the substrate; and
a conductor for providing electricity to the interface layer, the conductor being positioned
in contact with the interface layer and comprising strands configured to be separable and electrically
conductive.

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16. A method for connecting an electrical lead to a comparatively thin coating, the method comprising:

providing a substrate having a thickness;

applying to the substrate a coating, comparatively thin and comprising a conductive material;

5 positioning a conductor, comprising a plurality of independent strands, opposite the substrate in a position to provide electricity to the coating;

applying a clamping load urging the conductor toward the coating; and

redistributing, by the independent strands, mechanical and electrical loads directed toward the coating.

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